Alternative Solutions For Mid-Block Crossings.

Maricopa County Trails Commission

June 20, 2001

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Problem Definition

- Canals intersect more than 150 arterial streets in a mid-block location away from a signalized intersection.
- Not consistently marked or protected.
- Can pose a threat to trail users.
- Pedestrian Design Assistance Program report.

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Crossing Type Considerations

- Each crossing type should be considered based on:
  - Street classification.
  - User mode, i.e. pedestrian, horse, bicycle.
  - Traffic & Trail Volume.
  - Physical Constraints.
  - Cost.

Design Considerations

- Connections to bikeway systems.
- Minimize conflicts.
- Clear sight distance and visibility.
- Cost effective.
- Safe for all users.
- Regional applicability.
- Sufficient lighting.
- Heighten driver awareness.
- Accommodate equestrians.
- Strive for parity.

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Minimum Design Criteria

- Provide heightened awareness to the vehicle driver of the crossing through traffic calming or signalization.
- Provide some boundaries for the trail user by enhancing the visibility of the crossing.
- Reduce the crossing distance to two lanes at a time.

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Recommended Approach

- Curb extension to narrow lane width, raised sidewalk, rumble strip.
- Median island refuge and surface textures on approach, with traditional signing, and an option for in-pavement lighting.
- Pedestrian activated traffic signal device with traditional striping.

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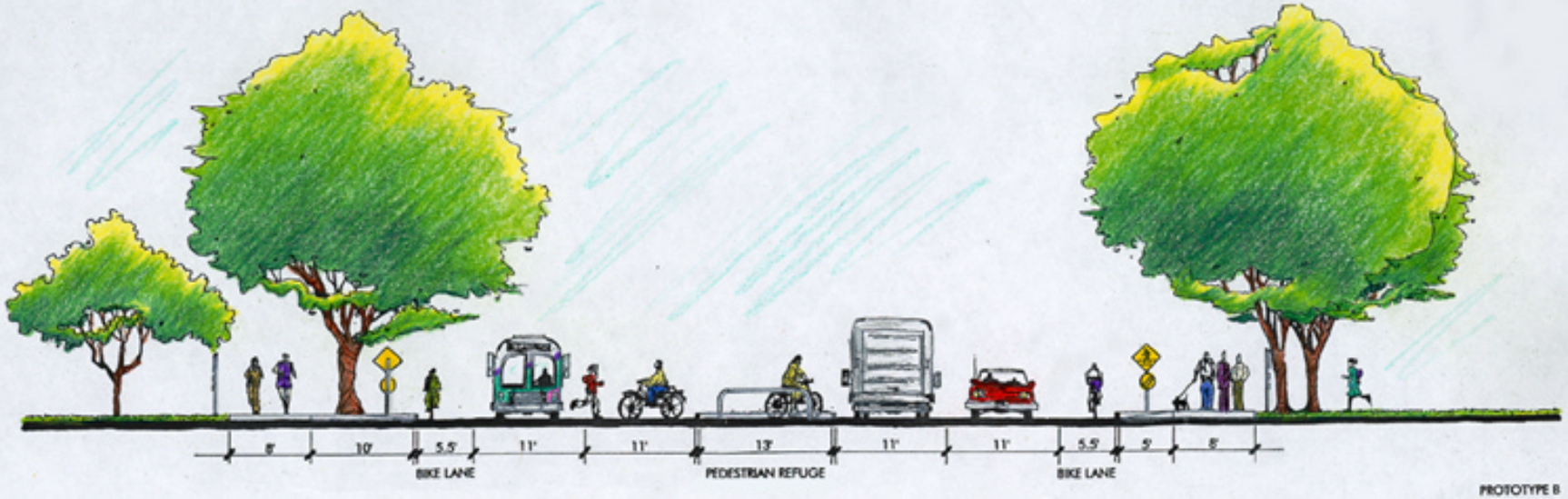
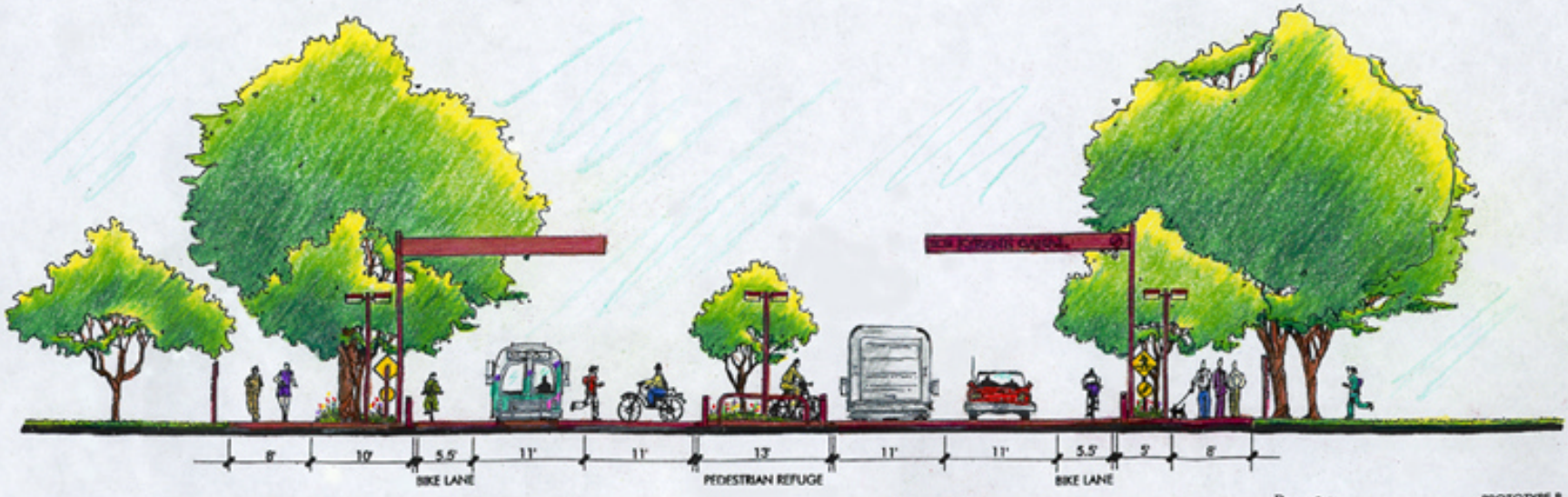


PROTOTYPE B
PROPOSED MINIMUM STANDARDS



PROTOTYPE B
PROPOSED ENHANCEMENTS

Types of Mid-Block Crossings

- At-Grade
- Grade Separated

At Grade Crossing over an arterial, along a canal.

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Mid-Block Crossing

This mid-block crossing could be enhanced with a median treatment.

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At-Grade Crossings

Signals

- Dictated by Manual of Uniform Traffic Control Devices (MUTCD)
- Advantages
  - Enhanced safety and visibility of pedestrians.
  - Motorists understand and respond to this device.
  - Increased user control.
  - Improved sight distances.
  - No turning movement conflict points.
  - Mid-block flashing signal provides warning to drivers.

Signals

- Disadvantages
  - Most crossings will not meet warrant conditions.
    - Approximately 200 to 300 pedestrians per hour.
  - High installation cost.
  - Disruption of traffic flow.
  - Additional maintenance involved.
  - Flashing signal does not provide a barrier for safe crossing.

Estimated Cost: $50,000 to $80,000 (2001 dollars).

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Signals

Signal with a pedestrian refuge median on a six lane arterial.

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Raised Crosswalks

- Advantages
  - Reduced vehicle speeds.
  - Easier crossing for pedestrians and wheelchair users.
  - Crosswalks are more visible to drivers.
- Disadvantages
  - Somewhat expensive.
  - May impact bicyclists.
  - May impact drainage.
  - Recommend only in specific situations.

Estimated Cost: $16,600 (2001 dollars).

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Textures

- Advantages
  - Increased alertness for users and drivers.
  - Aesthetically pleasing.
- Disadvantages
  - No physical prevention of high vehicle speeds.
  - Lack of accessibility to pedestrian in crossing.
  - Noisy.
  - Not favored by bicyclists.

Estimated Cost: $10,000 (2001 dollars).

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Textures -- Combination

Traditional traffic signal with textured crosswalk.

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Textures -- Intersection

Four way stop intersection with textured pavement.

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Railroad Arm Crossing

- Advantages
  - Drivers will stop for the arms.
  - Users will have good control over traffic gaps.
  - Readily recognizable to drivers.
  - Activated only when it is needed.
- Disadvantages
  - Relatively expensive to install.
  - Not previously used in this type of application.

Estimated Cost: $118,000 (2001 dollars).

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Railroad Arm Crossing

Trail users are safer at controlled intersections.

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Signing and Striping

- Advantages
  - Cost efficient.
  - Widely recognized by motorists.
  - Enhances visibility of crosswalks for drivers.
- Disadvantages
  - Give users a false sense of security.
  - Do not physically prevent or high vehicle speeds or driver inattention.

Estimated Cost: $500 to $3,000 (2001 dollars).

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Signing and Striping Combination

Pedestrian crossing (signing and striping) with activated signal.

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In-pavement Lighting

- Advantages
  - Increased visibility to drivers.
  - Some user control over traffic gaps.
  - Activated only when needed.
- Disadvantages
  - Somewhat expensive to build.
  - Relatively new technology.

Estimated Cost: $15,000 to $23,000 (2001 dollars).

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In-pavement Lighting

In-pavement lighting across a five lane arterial.

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Curb Extension (Bulb-Out)

- Advantages
  - Barrier at roadway edge slows down drivers.
  - Driver recognition of bicycle/pedestrian facility – uses extra caution
  - Users better seen by drivers
  - Less travel distance across roadway for users.
- Disadvantages
  - Only works on streets with lanes wider than 11 feet.
  - Additional accommodations for bicyclist space needed.

Estimated Cost: $1,660 (2001 dollars).

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Curb Extension (Bulb-Out)

Curb Extensions can also be used for traffic calming.

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Pedestrian Refuge (Median)

- Advantages
  - Reduced vehicle speed.
  - Enhanced pedestrian safety and visibility.
  - May prevent passing at pedestrian and bicycle crossings.
  - Provides space to wait for gaps in traffic.
  - Added attention to canal trail system.
  - Low-cost approach with a low impact on vehicle delay or safety.

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Pedestrian Refuge (Median)

- Disadvantages
  - Lanes must be wider than 11 feet.
  - Limited effect on speed of traffic.
  - Limited access for canal maintenance vehicles.
  - Possible maintenance costs.
  - Lack of bicyclist space along roadway.

Estimated Cost: $40,000 to $280,000 (2001 dollars).

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Pedestrian Refuge (Median)

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Grade-Separated Crossings

Overhead Bridge/Overpass

- Advantages
  - No impediments in volume or speed of traffic.
  - Pedestrian security from vehicular collision.
- Disadvantages
  - Requires sufficient space for ramps and utilities.
  - Can create a visual intrusion on nearby backyards.
  - Costly.

Estimated Cost: $350,000 to $1.0 Million+ (2001 dollars).

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Overhead Bridge/Overpass

Grade separated walkway over a seven lane arterial.

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Overhead Bridge/Overpass

Grade separated walkway over a three lane arterial.

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Overhead Bridge/Overpass

Not everyone uses overhead walkways.

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Underground Tunnel/Underpass

- Advantages
  - No impediments in volume or speed of traffic.
  - Pedestrian security from vehicular collision.

Estimated Cost:
$500,000 - $1.0 Million+
(2001 Dollars)

- Disadvantages
  - Requires sufficient space for ramps and utilities.
  - Strong security objections.
  - One of the most costly alternatives.
  - High maintenance and cleaning cost.

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Underground Tunnel/Underpass

Underground walkway below a six lane arterial.

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Underground Tunnel/Underpass

Underpass adjacent to a river.

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